A REAPPRAISAL OF THE ORCHID GENERA *BROUGHTONIA* R. BR., *CATTLEYOPSIS* LEM. AND *LAELIOPSIS* LINDL.

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ABSTRACT

The orchid genera *Broughtonia* R. Br., *Cattleyopsis* Lem. and *Laeliopsis* Lindl. are re-established on the basis of observations of natural populations or living material from them. The six species that comprise these genera were previously placed in the genus *Broughtonia*. A new combination, *Cattleyopsis cubensis* (Lindl.) Sauleda and Adams and a new natural hybrid, *Broughtonia* ×*jamaicensis*, are reported.

Key Words: Orchids, *Broughtonia*, *Cattleyopsis*, *Laeliopsis*, monograph

The taxonomic status of the orchid genera *Broughtonia* R. Br., *Cattleyopsis* Lem. and *Laeliopsis* Lindl. has been the subject of much controversy. There appears to have been three major, but often overlapping, taxonomic approaches to these three genera. One approach retains the three genera as distinct entities (Correll, 1941; Leon, 1946). Another approach incorporates *Laeliopsis* into *Broughtonia*, ultimately recognizing the existence of only two genera, *Broughtonia* and *Cattleyopsis* (Rolfe, 1889; Cogniaux, 1910; Schlechter, 1915; Acuña, 1939; Fowlie, 1961a and 1961b). The third approach incorporates the genera *Laeliopsis* and *Cattleyopsis* into the genus *Broughtonia*, lumping all species into a single genus (Dressler, 1966; Liogier, 1969; Adams, 1970 and 1971).

Much of this taxonomic confusion was caused initially by the floral similarities of some of these species which resulted in gross misidentifications. Once these problems were resolved and the six species that comprise the group were established, their differentiation into genera was impeded because of: 1) a failure to examine natural populations of all species in the group as well as their distributional patterns; 2) a startling misunderstanding of the morphology of the nectary; and 3) a disagreement on the number and significance of pollinia in certain species in the group.

All the botanists who have made taxonomic decisions concerning this group of orchids neither saw natural populations of each of the six species nor possessed living material of them. Most decisions were based on scanty collections of dried herbarium specimens. Adams (1970) recognized this failure when he stated that taxonomi-

cally, "almost every error as we now see it can be attributed to the extreme difficulty of obtaining reliable factual information from a small number of inadequate herbarium specimens...".

The terms "spur", "nectary-spur", "sepaline tube" and "external adnate spur" have all been used as a principal character in the separation of the genus *Broughtonia* from *Cattleyopsis* and *Laeliopsis*. The use of this character in this group requires that its precise morphological identity be determined and its presence or absence in each of the species in the alliance be ascertained. In no case has the morphology of the nectary been carefully studied, presumably owing to the lack of fresh material available for dissection.

The number and symmetry of the pollinia in species of this alliance also has been a source of confusion. As Adams (1970) pointed out, even in good dried herbarium specimens, "the pollinia are often missing altogether, either having been removed naturally or stuck to the drying sheets".

We have examined natural populations or living specimens collected from natural populations of all six species in the alliance as well as extant herbarium specimens and types. Their distinctive distributional patterns strongly suggest evolutionary divergence as a function of isolation. The three species comprising the genus *Cattleyopsis* are restricted to Cuba, with the exception of *C. lindenii* which extends northward into the Bahama Archipelago. The two species of *Broughtonia* are endemic to Jamaica, while the monotypic genus *Laeliopsis* occurs on Hispaniola and Mona Island. The floral similarities among certain members of this alliance are attributable in part to what we perceive as secondary adaptations to ornithophily or to melittophily. The vegetative similarities of the four species that comprise the genera *Cattleyopsis* and *Laeliopsis* are attributable in part to secondary adaptations to the more xeric habitats in which they occur. In addition, we have noticed that *Laeliopsis* appears to make vegetative phenotypic adjustments to environmental conditions more readily than does either *Cattleyopsis* or *Broughtonia*. For example, vegetatively, *Laeliopsis* resembles *Broughtonia* in mesic habitats and *Cattleyopsis* in xeric habitats.

The confusion concerning the terms "spur", "nectary-spur", "sepaline tube" and "external adnate spur" was easily resolved when we made cross-sectional dissections of living flowers of each species. Unequivocally, none of these structures occurs. Instead, each species has a well-defined nectary embedded within the ovary. In all six

species of the alliance the nectary lumen is wide at its distal opening, gradually narrowing proximally, except in the two species of *Broughtonia,* in which the proximal end of the nectary lumen swells to form a nectar-filled chamber. The externally visible proximal swelling has been confused with a spur or sepaline tube.

Arditti (1969) and Arditti and Fisch (1977) were the only researchers to recognize the true nature of the nectary in this group although they failed to note the prominent proximal nectary chamber present only in *Broughtonia.* This understanding of the nature of the nectary, when coupled with their results of pigment analyses, led Arditti and Fisch (1977) to question the lumping of all six species into the genus *Broughtonia* by Dressler (1966).

We agree with Dressler (1966) that the number of pollinia is not an inviolable generic character. However, differences in distributional patterns, and in vegetative and floral morphology, combined with differences in the number and symmetry of pollinia, are compelling reasons to maintain separation of the three genera *Broughtonia, Cattleyopsis* and *Laeliopsis* (Table I).

KEY TO THE GENERA

1. Leaves coriaceous, margin entire; column short relative to pedicel, wings short and thick; nectary lumen swollen proximally ..... **1.** *Broughtonia*
1. Leaves fleshy-rigid, margin erose; column elongate, relative to pedicel, narrowly-winged; nectary lumen not swollen proximally 2
   2. Pollinia 8, unequal; column with basal appendages .....**2.** *Cattleyopsis*
   2. Pollinia 4, equal; column without basal appendages .....**3.** *Laeliopsis*

1. Broughtonia Robert Brown in Aiton, Hort. Kew, ed. 2, 5: 217. 1813.

Epiphytic plants; rhizomatous; roots velamentous; stems modified into ellipsoid to ovoid pseudobulbs; leaves coriaceous, margin entire; inflorescence terminal; ovary pedicellate, with a proximally swollen nectary; labellum entire, obovate or obovate to orbicular; column short, blunt, wings near apex short and thick; anther terminal, incumbent, operculate; pollinia 4, equal, with a caudicle; capsule smooth, ellipsoid.

TYPE: **Epidendrum sanguineum** Sw.

This genus contains two species, endemic to Jamaica.

Table I. Major characteristics which differentiate the genera *Broughtonia*, *Cattleyopsis* and *Laeliopsis*.

Genus	Leaves		Pollinia		Column				Distribution
	Margin	Rigidity	Number	Symmetry	Length relative to pedicel	Apical wings	Basal appendages	Nectary lumen	
Cattleyopsis	erose	fleshy-rigid	8	unequal	elongate	narrow	present	distally swollen, gradually narrowing proximally	Bahama Islands, Cuba
Laeliopsis	erose	fleshy-rigid	4	equal	elongate	narrow	absent	distally swollen, gradually narrowing proximally	Hispaniola and Mona Island
Broughtonia	entire	coriaceous	4	equal	short	short and thick	absent	distally swollen, mesally narrowing, proximally swollen	Jamaica

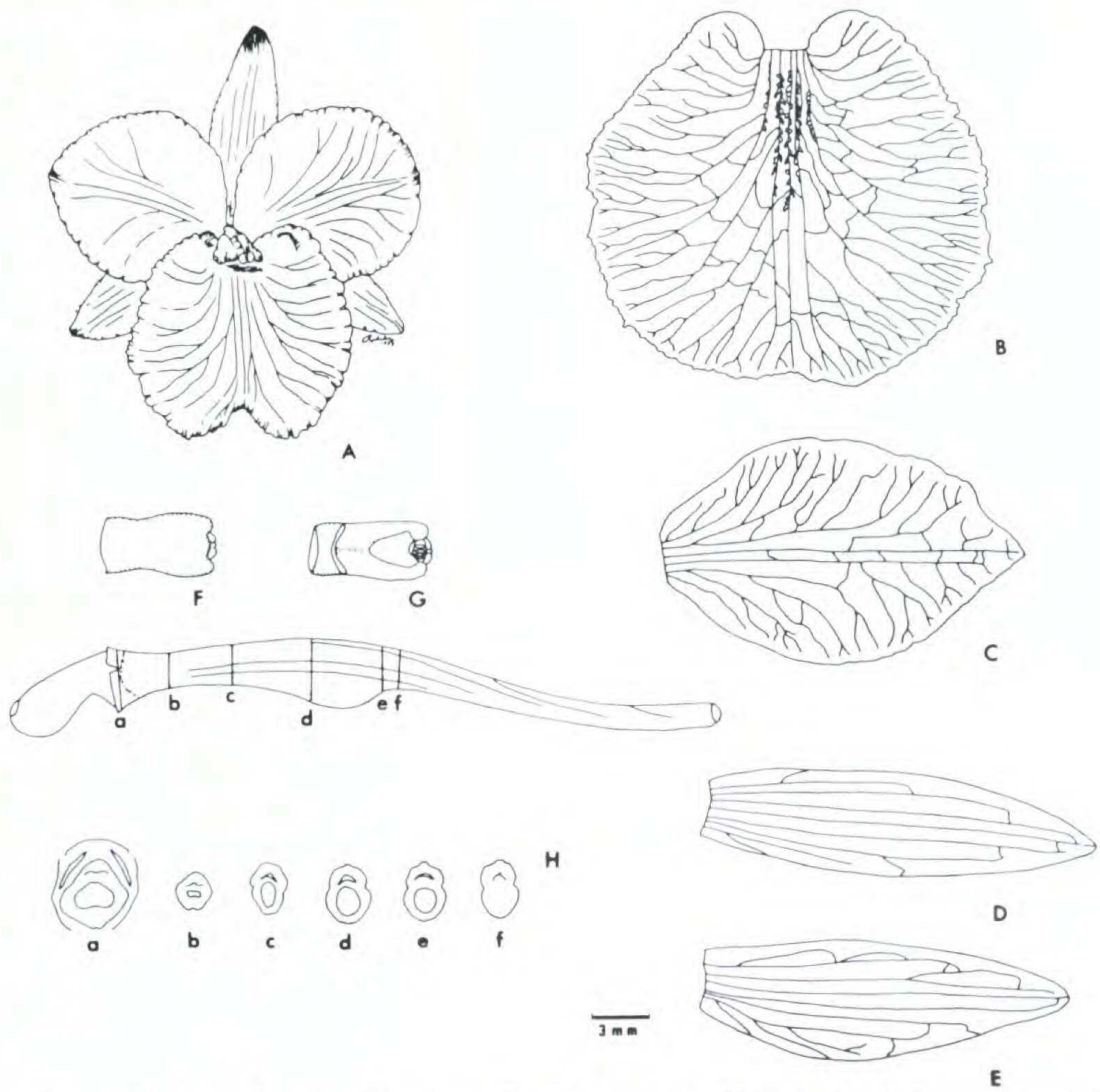

Figure 1. *Broughtonia sanguinea* (Sw.) R. Br. **A.** Flower, frontal view. **B.** Labellum, frontal view. **C.** Petal. **D.** Dorsal sepal. **E.** Lateral sepal. **F.** Column, dorsal view. **G.** Column, ventral view. **H.** Column and ovary, lateral view and serial cross sections (a–f) showing nectary lumen.

KEY TO THE SPECIES

1. Basal margins of labellum not involute, not enclosing column, not forming a tube; center of labellum glabrous ..... 1. *B. sanguinea*
1. Basal margins of labellum involute, enclosing column, forming a tube; center of labellum with yellow villous lamellae ..... 2. *B. negrilensis*

1. **Broughtonia sanguinea** (Sw.) R. Br. in Aiton, Hort. Kew ed. 2, 5: 217. 1813. (Figure 1)

Epidendum sanguineum Sw., Prodr. Veg. Ind. Occ. 124. 1788.

Dendrobium sanguineum (Sw.) Sw., Nov. Act. Ups. 6: 82. 1799. TYPE: No holotype indicated. A search of the major herbaria known to contain collections of

Swartz failed to uncover any specimens that can be ascertained to have been collected or examined by Swartz. In the absence of a holotype, a lectotype is here chosen from material cited by Swartz in the protologue. LECTOTYPE designated here: Plate 121, figure 2, in H. Sloane, A Voyage to the Islands Madera, Barbados, Nieves, S. Christophers and Jamaica, Vol. I, 1707.

Broughtonia coccinea Hook., Bot. Mag. 63, t. 3536. 1836. Based on *Broughtonia sanguinea* (Sw.) R. Br.

Plant epiphytic, rhizomatous, to 72 cm tall; roots numerous, thick, velamentous; rhizome short, stout, creeping or ascending, enclosed by imbricating scarious sheaths; stem modified into pseudobulb, erect or ascending, clustered, ellipsoid to ovoid, flattened, to 5 cm long, 4 cm wide, 3 cm thick, basally enclosed by scarious sheaths, to 4-leaved at apex; leaves coriaceous, elliptic to oblong or ligulate, subacute, margin entire, to 18 cm long, 3 cm wide; inflorescence to 67 cm tall, peduncle slender, erect, distantly several-sheathed, simple or paniculate raceme, to 18 flowers; floral bracts ovate, acute, to 0.4 cm long, 0.2 cm wide; ovary slender, to 4 cm long; sepals and petals pink, white, yellow or usually reddish-lavender to red; sepals elliptic to lanceolate, acute, to 2.7 cm long, 0.8 cm wide; petals oblong to orbicular, abruptly acute, to 2.4 cm long, 1.6 cm wide; labellum pink, white, yellow or usually reddish-lavender to red, with a central basal yellow spot and 8–12 radiating red veins, to 3 cm long, 2.7 cm wide, broadly obovate to orbicular, center of labellum glabrous, basal margins not involute, not completely enclosing column, margin erose, shallowly emarginate; column white, occasionally tinged with red, to 0.8 cm long, 0.5 cm wide, anther white; capsule pendent, to 2.4 cm long, 0.8 cm thick.

REPRESENTATIVE SPECIMENS: Jamaica: Parish of St. Elizabeth, Pepper, 13 Mar 1931, *Miller 1349* (US); coastal region E of Montego Bay, 28 Mar 1920, *Maxon & Killip 1626* (AMES, NY); Great Goat Island, 19 Apr 1906, *Harris 9209* (NY); Lover's Leap, Santa Cruz Mts., 4 Sep 1907, *Britton 1148* (NY).

FLOWERING PERIOD: Flowers sporadically throughout the year, mainly from March to June.

Vegetatively, this species may be confused with *Broughtonia negrilensis* Fowlie. Florally they differ significantly in color and in the position of the basal margins of the labellum. *Broughtonia sanguinea* is usually reddish-lavender to red, while *B. negrilensis* is pink to lavender. In *B. negrilensis* the basal margins of the labellum are involute, enclosing the column to form a tube and the center of

the labellum has yellow villous lamellae, while in *B. sanguinea* the basal margins are not involute, do not enclose the column and the center of the labellum is glabrous.

A rare autogamous dwarf form occurs with flowers that remain partially closed. Hooker illustrated this dwarf form as *Broughtonia sanguinea* (Bot. Mag. 58, t. 3076, 1831) and later, after seeing the more common fully-opened form, mistakenly named it *B. coccinea* Hook. (Bot. Mag. 63, t. 3536, 1836). Inexplicably, Hooker based *B. coccinea* on *B. sanguinea* (Sw.) R. Br. making *B. coccinea* a superfluous name at the time of publication.

Although this species is endemic to Jamaica, the name has been misapplied to *Cattleyopsis ortgiesiana* (Reichb. f.) Cogn. (Grisebach, 1866; Cogniaux, 1910; Acuña, 1939), a species endemic to Cuba.

In southwestern Jamaica, on Negril Ridge, where *Broughtonia sanguinea* and *B. negrilensis* are sympatric, a natural hybrid occurs which is intermediate between the two parental species. Introgressive hybridization appears to occur between this natural hybrid and *B. sanguinea*, accounting for the high degree of variability in shape and color of the floral parts of *B. sanguinea* in the areas of sympatry. A series of experimental crosses verified the introgression.

2. **Broughtonia negrilensis** Fowlie, Orch. Digest 25: 417–418. 1961. (Figure 2) TYPE: JAMAICA, Negril Ridge, 2 mi SW of Old Hope, elev. 250 ft., epiphytic on *Ceiba*, collected Nov. 1959, flowered in cultivation at the Los Angeles State and County Arboretum at Arcadia, California, *Fowlie s.n.* (HOLOTYPE: LASCA).

Broughtonia domingensis auct. non (Lindl.) Rolfe: Fawcett & Rendle, Fl. Jam. I: 24, 1910; Cogn. in Urban, Symb. Antill. 6: 543, 1910.

Laeliopsis domingensis auct. non (Lindl.) Lindl.: Grisebach, Fl. B. W. I., 621, 1864.

Plant epiphytic, rhizomatous, to 75 cm tall; roots numerous, velamentous; rhizome short, stout, creeping or ascending, enclosed by imbricating scarious sheaths; stem modified into pseudobulb, erect or ascending, clustered, ellipsoid to ovoid, flattened, to 6.0 cm long, 2.8 cm wide, 1.8 cm thick, basally enclosed by scarious sheaths, to 3-leaved at apex; leaves coriaceous, elliptic to oblong, subacute, margin entire, to 12 cm long, 2.4 cm wide; inflorescence to 69 cm

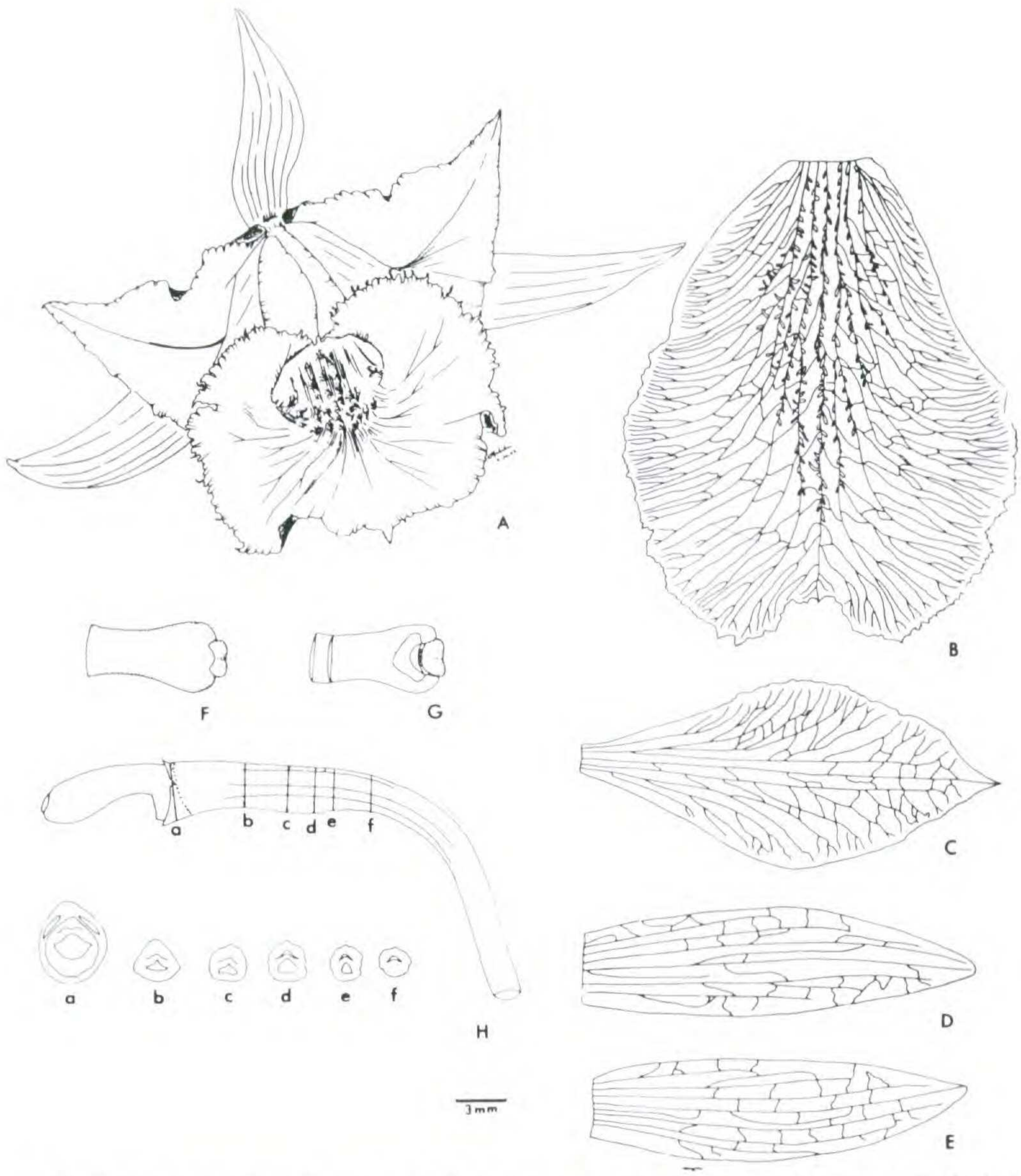

Figure 2. *Broughtonia negrilensis* Fowlie. **A.** Flower, frontal view. **B.** Labellum, frontal view. **C.** Petal. **D.** Dorsal sepal. **E.** Lateral sepal. **F.** Column, dorsal view. **G.** Column, ventral view. **H.** Column and ovary, lateral view and serial cross sections (a–f) showing nectary lumen.

tall, peduncle slender, erect, distantly several-sheathed, simple or rarely paniculate raceme, to 12 flowers; floral bracts ovate, acute, to 0.6 cm long, 0.3 cm wide; ovary slender, to 3.0 cm long; sepals pink to lavender, linear-oblong, subacute, to 2.8 cm long, 0.8 cm wide; petals pink to lavender, broadly-oblanceolate to obovate, acute, to 3.0 cm long, 1.3 cm wide; labellum basally yellow, pink to lavender towards apex, with purple lines from center radiating to near mar-

gin, to 3.6 cm long, 2.9 cm wide, obovate, basal margins involute, enclosing column, forming a tube, center of labellum with yellow villous lamellae, margin crenate-dentate, undulate, emarginate; column white, occasionally tinged with pink, to 0.9 cm long, 0.5 cm wide, anther white; capsule pendent, to 2.8 cm long, 1.0 cm thick.

SPECIMEN EXAMINED: JAMAICA: Negril Ridge, Jun 1967, *Gauntlett s.n.*, flowered in cultivation (USF).

FLOWERING PERIOD: Flowers sporadically throughout the year, mainly from October to December.

Broughtonia negrilensis is similar vegetatively to *B. sanguinea* R. Br. but florally can be easily distinguished by floral color and by shape and ornamentation of the labellum.

This species was incorrectly referred to *Laeliopsis domingensis* (Lindl.) Lindl. by Grisebach (1864) and to *Broughtonia domingensis* (Lindl.) Rolfe by Fawcett & Rendle (1910) and Cogniaux (1910). *Laeliopsis domingensis* is a different species endemic to Hispaniola while *Broughtonia domingensis* is a synonym of it.

NATURAL HYBRID

Broughtonia ×jamaicensis Sauleda & Adams, *hybr. nov.* (Figure 3) *Broughtonia sanguinea* (Sw.) R. Br. × *Broughtonia negrilensis* Fowlie

Hybrida floraliter intermedia. Plantae epiphyticae, rhizomatosae; pseudobulbi ellipsoidei usque ovoidei; folia coriacea, elliptica usque oblonga; inflorescentia erecta, simplex vel paniculata; flores rosei usque rubeo-lavenduli.

Plants epiphytic, rhizomatous, to 68 cm tall; roots numerous, velamentous; rhizome short, stout, creeping or ascending, enclosed by imbricating scarious sheaths; stem modified into pseudobulb, erect or ascending, clustered, ellipsoid to ovoid, flattened, to 4.8 cm long, 2.7 cm wide, 1.9 cm thick, basally enclosed by scarious sheaths, 2-leaved at apex; leaves coriaceous, elliptic to oblong, subacute, margin entire, to 9.6 cm long, 2.3 cm wide; inflorescence to 63 cm tall, peduncle slender, erect, simple or paniculate raceme, to 8 flowers; floral bracts ovate, acute, to 0.5 cm long, 0.3 cm wide; ovary slender, with proximally swollen nectary, to 3.2 cm long; sepals and petals pink to reddish-lavender, elliptic, acute, to 2.8 cm

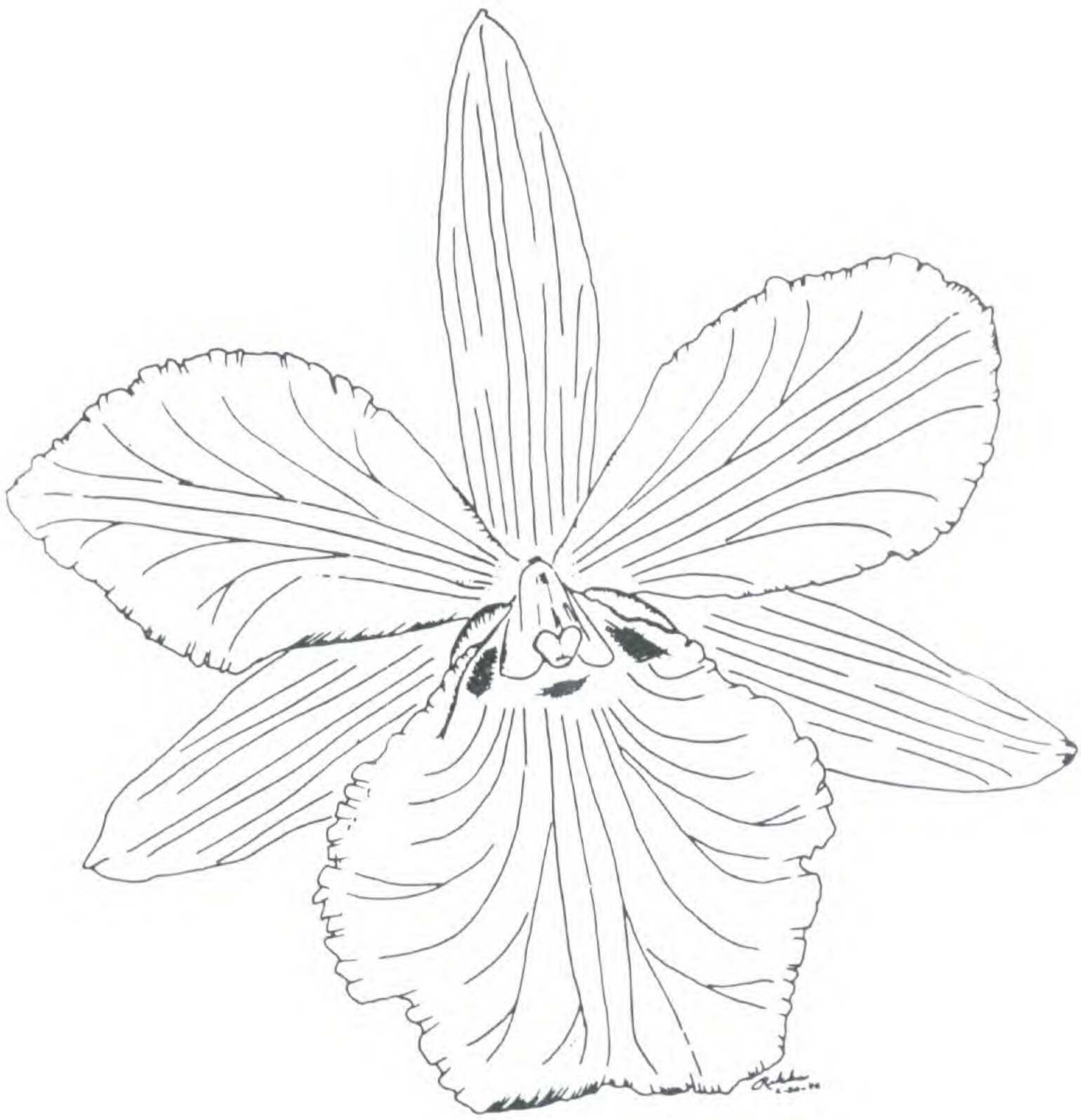

Figure 3. *Broughtonia* ×*jamaicensis* Sauleda & Adams. Flower, frontal view, × 2.

long, 0.6 cm wide; petals obovate to oblong, acute, to 2.8 cm long, 1.3 cm wide; labellum pink to reddish-lavender, basally usually yellow, with purple lines from center radiating to near margin, to 3.4 cm long, 2.7 cm wide, obovate, basal margins slightly involute but not completely enclosing column, center of labellum occasionally with a few yellow villous lamellae, margin crenate-dentate, undulate, emarginate; column white, to 0.9 cm long, 0.5 cm wide, anther white.

TYPE: JAMAICA: Negril Hill, Jun 1967, *Gauntlett s.n.* (HOLOTYPE: NY). Flowered in cultivation September 1968.

FLOWERING PERIOD: Flowers sporadically throughout the year, mainly from August to October.

This natural hybrid has been referred to in the literature (Adams, 1970 and 1971; Fowlie, 1961a and 1961b) on several occasions but has not been named.

Florally, the hybrid is intermediate between the parental species and occurs commonly where they are sympatric. The labellum has the characteristic yellow villous lamellae of *Broughtonia negrilensis* while the basal margin of the labellum is slightly involute but does not enclose the column, a characteristic of *B. sanguinea*. This hybrid is named for the type location.

2. Cattleyopsis Lemaire, Jard. Fleur. 4, Misc. p. 59. 1853.

Epiphytic plants; rhizomatous; roots velamentous; stems modified into cylindric, ovoid or pyriform pseudobulbs; leaves fleshy-rigid, margin erose; inflorescence terminal; ovary pedicellate; labellum entire, oblong or obovate to orbicular; column elongate, slender, with two auricle-like appendages near the base, narrowly winged towards apex; anther terminal, incumbent, operculate; pollinia 8, unequal, with a caudicle; capsule smooth, ellipsoid.

TYPE: **Cattleyopsis delicatula** Lemaire

This genus contains three species endemic to xeric regions of Cuba and the Bahama Archipelago.

KEY TO THE SPECIES

1. Basal margin of labellum enclosing column, forming a tube; center of labellum with yellow villous lamellae; margin of labellum incised to crenate-dentate or crenate 2
1. Basal margin of labellum not enclosing column; center of labellum glabrous; margin of labellum entire ..... 3. *C. ortgiesiana*
  2. Labellum oblong; leaves obtuse ..... 1. *C. cubensis*
  2. Labellum broadly-obovate to orbicular; leaves acute ..... 2. *C. lindenii*

1. **Cattleyopsis cubensis** (Lindl.) Sauleda & Adams, *comb. nov.* (Figure 4)

Epidendrum cubense Lindl., Bot. Reg. 29, Misc. p. 17. 1843.
Laeliopsis cubense (Lindl.) Lindl. ex Cogn. in Urban, Symb. Antill. 6: 543. 1910, pro syn.

Broughtonia cubensis (Lindl.) Cogn. in Urban, Symb. Antill. 6: 542. 1910. TYPE: CUBA, imported to England by Messrs. Loddiges (HOLOTYPE: K-L, photograph seen).

Plant epiphytic, rhizomatous, to 33 cm tall; roots few, thick, velamentous; rhizome short, stout, creeping or ascending, enclosed by imbricating scarious sheaths; stem modified into pseudobulb, erect or ascending, clustered, ovoid to pyriform, to 3 cm long, 1 cm wide, enclosed by scarious sheaths, to 2-leaved at apex; leaves

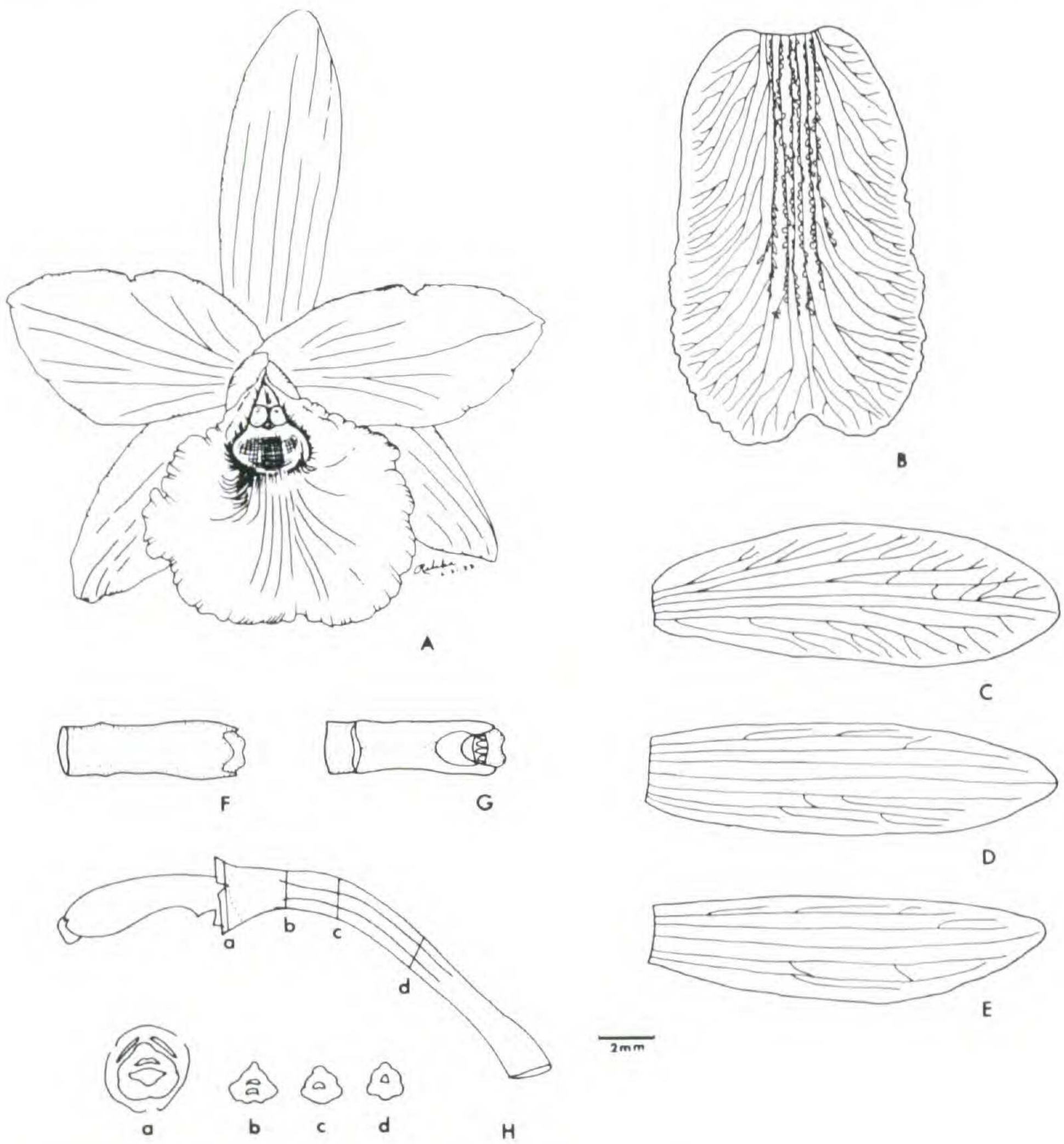

Figure 4. *Cattleyopsis cubensis* (Lindl.) Sauleda & Adams. **A.** Flower, frontal view. **B.** Labellum, frontal view. **C.** Petal. **D.** Dorsal sepal. **E.** Lateral sepal. **F.** Column, dorsal view. **G.** Column, ventral view. **H.** Column and ovary, lateral view and serial cross sections (a–d) showing nectary lumen.

fleshy-rigid, oblong, obtuse, margin minutely erose, to 8 cm long, 1 cm wide; inflorescence to 30 cm tall, peduncle slender, erect, distantly several-sheathed, simple raceme, to 8 flowers; floral bract ovate, acute, to 0.2 cm long, 0.1 cm wide; ovary slender, to 1.5 cm long; sepals pink to yellowish-pink, linear oblong to ligulate, obtuse, to 1.8 cm long, 0.5 cm wide; petals pink to yellowish-pink, oblong, obtuse, to 1.8 cm long, 0.7 cm wide; labellum pink to yellowish-pink with reddish-pink radiating lines near base extending to margin, to 2.0 cm long, 1.1 cm wide, oblong, basal margins involute enclosing column, forming a tube, center of labellum with yellow villous lamellae, margin crenate, shallowly emarginate; column pink, to 0.7 cm long, 0.3 cm wide, anther pink to reddish-pink; capsule pendent, to 2.5 cm long, 1.2 cm thick.

SPECIMEN EXAMINED: CUBA: Prov. de Pinar del Rio, Peninsula de Guanahacabibes, 2–3 mi E of Caleta Piojo, near Sawmill La Posa de Juan Claro, Jul 1959, *Osment s.n.* (USF).

FLOWERING PERIOD: Flowers sporadically throughout the year, mainly from December to March.

Cattleyopsis cubensis was first described by Lindley (1843) as *Epidendrum cubense* Lindl. and later (Lindley, 1853) referred it to the genus *Laeliopsis* Lindl. without formal transfer. Although Lindley examined living material, he failed to recognize that the anthers contained eight unequal pollinia. Cogniaux (1910) also failed to note the number of pollinia and transferred this species to the genus *Broughtonia* R. Brown. Correll (1941 and pers. comm.), after examining a photograph of the type, concluded that the exact taxonomic status of this species was not clear and in the absence of living material suggested that it should be retained in the genus *Laeliopsis,* to which Lindley (1853) had originally referred it. Dressler (1966) examined the type and considered it to be conspecific with *Epidendrum chinense* Lindl. and placed it under synonymy with *Barkeria chinensis* (Lindl.) Thien ex Dressler.

We have examined three living plants of this species which were collected by William Osment in Prov. de Pinar del Rio, Cuba, July 1959. Additionally, we have examined the progeny of selfing crosses from the original material. In every case, the specimens have eight unequal pollinia, elongate and narrowly-winged columns with basal appendages, no proximally swollen nectaries and erose leaf mar-

gins. Taken together, these characters unequivocally place these specimens in the genus *Cattleyopsis* Lemaire.

Furthermore, an examination of a photograph of the holotype of *Barkeria chinensis* convinces us that *Cattleyopsis cubensis* is not conspecific with it.

2. **Cattleyopsis lindenii** (Lindl.) Cogn. in Urban, Symb. Antill. 6: 544. 1910. (Figure 5)

Laelia lindenii Lindl., Orch. Lind. 10. 1846.

Bletia lindenii (Lindl.) Reichb. f., Walp. Ann. Bot. 6: 431. 1862.

Laeliopsis lindenii (Lindl.) Lindl. ex Cogn. in Urban, Symb. Antill. 6: 545. 1910, pro syn.

Broughtonia lindenii (Lindl.) Dressler, Taxon 15: 241. 1966. TYPE: CUBA, *Linden 1805* (HOLOTYPE: K-L, photograph seen).

Cattleyopsis delicatula Lem., Jard. Fleur. 4, Misc. p. 59. 1853. TYPE: No holotype indicated and a search of the major herbaria of Europe failed to uncover any specimens that can be ascertained to have been collected or examined by Lemaire. LECTOTYPE designated here: Figures 1-3 in Lemaire's Jard. Fleur. 4, p. 60, 1853.

Cattleyopsis northropiorum Cogn. in Urban, Symb. Antill. 6: 545. 1910. TYPE: No holotype indicated. LECTOTYPE here designated from syntypes: Bahama Islands, Andros, *Northrop & Northrop 437* (AMES).

Cattleyopsis guanensis Acuna, Cat. Descr. Orquid. Cub., Estac. Exper. Agron. Bol. Tec. 60: 109-110, 1939, *nom illeg.*, lacking Latin diagnosis. TYPE: CUBA, Pinar del Rio, Guane, *Fors 4837* (HOLOTYPE: Present location of specimen in Cuba not known, photograph seen at AMES).

Cattleya domingensis auct. non Lindl.: Britton & Millspaugh, Bahama Fl. 95, 1920; Richard, in Sagra's Hist. Fisica, Polit. Nat. Isl. Cuba, pt. 2, 11: 243, 1850.

Laeliopsis domingensis auct. non (Lindl.) Lindl.: Britton & Millspaugh, Bahama Fl. 95, 1920; Northrop, Mem. Torr. Bot. Cl. 12: 30, 1902.

Broughtonia domingensis auct. non (Lindl.) Rolfe: Cogn. in Urban. Symb. Antill. 6: 543, 1910; Britton & Millspaugh, Bahama Fl. 95, 1920.

Broughtonia lilacina auct. non Henfr.: Northrop, Mem. Torr. Bot. Cl. 12: 30, 1902.

Plant epiphytic, rhizomatous, to 68 cm tall; roots numerous, thick, velamentous; rhizome short, stout, creeping or ascending, enclosed by imbricating scarious sheaths; stem modified into pseudobulb, erect or ascending, clustered, cylindric to narrowly ovoid, to 8 cm long, 2 cm wide, enclosed by scarious sheaths, to 3-leaved at apex; leaves fleshy-rigid, oblong to linear-oblong, acute to apiculate, subcanaliculate, margin erose, to 11 cm long, 2.5 cm wide; inflorescence to 60 cm tall, peduncle slender, erect, distantly

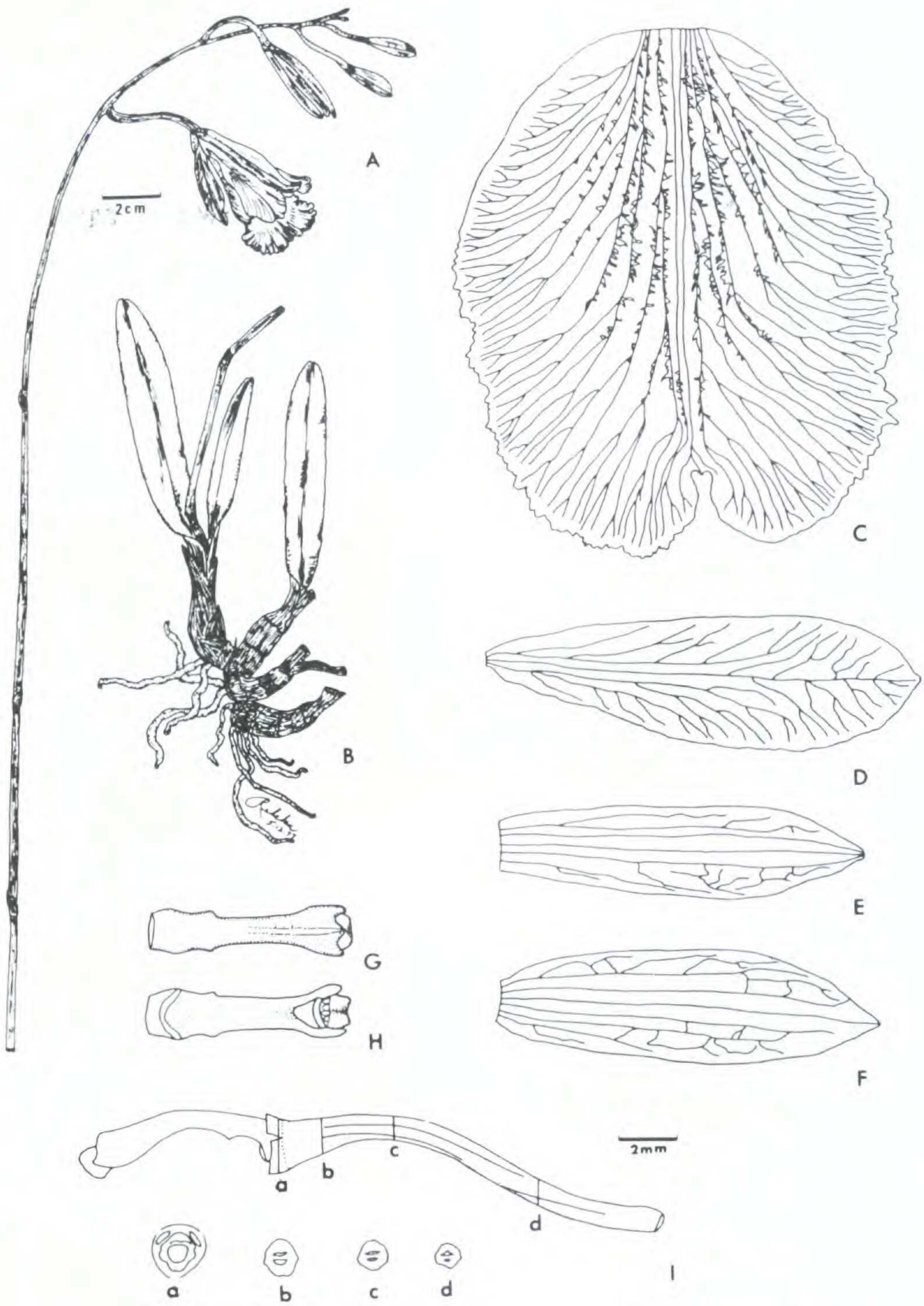

Figure 5. *Cattleyopsis lindenii* (Lindl.) Cogn. **A.** Inflorescence. **B.** Plant. **C.** Labellum, frontal view. **D.** Petal. **E.** Dorsal sepal. **F.** Lateral sepal. **G.** Column, dorsal view. **H.** Column, ventral view. **I.** Column and ovary, lateral view and serial cross sections (a–d) showing nectary lumen.

several-sheathed, simple or paniculate raceme, to 12 flowers; floral bracts ovate, acute, to 0.5 cm long, 0.3 cm wide; ovary slender, to 2.5 cm long; sepals pink to lavender, linear-oblanceolate, acute, to 2.8 cm long, 0.8 cm wide; petals pink to lavender, narrowly obovate to oblanceolate, subobtuse to acute, to 2.4 cm long, 1.0 cm wide; labellum pink to lavender with purple lines radiating from center to near margin, to 3.5 cm long, 3 cm wide, broadly-obovate to orbicular, basal margins involute enclosing column, forming a tube, center of labellum with yellow villous lamellae, margin incised to crenate-dentate, undulate, deeply emarginate; column white, to 1.2 cm long, 0.3 cm wide, arcuate, anther greenish-white; capsule pendent, to 3.0 cm long, 1.5 cm thick.

REPRESENTATIVE SPECIMENS: **Bahama Islands:** GREAT ABACO, near North Harbour, 20 Jul 1904, *Barbour 773* (AMES); Cherokee Sound, 29 Dec 1904, *Brace 1942* (F, NY); Abaco Heights road, 11 Apr 1979, *Sauleda & Correll 2262* (FAU); Guiana Schooner Bay, 12 Apr 1979, *Sauleda & Correll 2304* (FAU); Hole-in-the-Wall, 28 Jun 1980, *Sauleda & Sauleda 3667* (FAU). LITTLE ABACO, near Fox Cay settlement, 4 Aug 1979, *Sauleda, Adams & Adams 2864* (FAU). ANDROS ISLAND, mangrove swamp, SE edge of Lake Forsythe, 6 Nov 1976, *Sauleda 1530* (FAU); 8 mi S of Fresh Creek, 5 Feb 1977, *Sauleda 1834* (FAU); Deep Creek, 2 May 1979, *Sauleda & Correll 2465* (USF). BIMINI GROUP, South Bimini, 15 Apr 1904, *Millspaugh 2397* (F, NY). ELEUTHERA, N. of James Cistern, 17 May 1975, *Correll & Hill 45248* (FTG). GREAT EXUMA, 6 mi N of George Town, 22 Jan 1979, *Sauleda, Correll & Correll 2200* (FAU). GRAND BAHAMA, Garden Cay, West End, 16 Apr–8 May 1905, *Brace 3660* (F, NY). LONG ISLAND, Gordons, trail to lighthouse, 7 Jul 1974, *Hill 2426* (FTG). MAYAGUANA, *Dykes s.n.* (AMES). **Cuba:** Prov. de Oriente, southern Baracoa region, 17 Jul–4 Aug 1924, *Leon 11761* (NY); Prov. de Oriente, Guantanamo Bay, 17–30 Mar 1909, *Britton 2230* (NY); Prov. de Pinar del Rio, Pan de Azucar, 5 Feb 1956, *Morton 9834* (US); Isle of Pines, top of Sierra de los Caballos, 12 May 1910, *Jennings 230* (NY).

FLOWERING PERIOD: Flowers sporadically throughout the year, mainly from May to September.

Cattleyopsis lindenii is a highly variable species distributed only in the Bahama Islands and Cuba. The Cuban populations are characteristically larger florally and vegetatively, and the flowers open more fully than those in the Bahamas. While these characteristics appear to predominate in the two areas, occasional variants can be found.

Cattleyopsis lindenii was first described by Lindley (1846) as *Laelia lindenii*, based on a Cuban specimen. *Cattleyopsis northropiorum* was first described by Cogniaux (1910) based mainly on

collections from the Bahama Islands. A comparison of the types cited by these authors convinced us that *C. northropiorum* represents the smaller-flowered and more closed form of *C. lindenii* and should be considered a synonym of it.

Cattleyopsis guanensis was first described by Acuña (1939) based on a specimen collected in Cuba. We compared a photograph of the type of *C. lindenii* with a photograph of the type of *C. guanensis*. Additionally, we examined a color photograph of the type plant of *C. guanensis* in flower, taken by Acuña. We are convinced that *C. guanensis* is in reality the small-flowered *C. lindenii*, but a peculiarly dark lavender form, and should therefore be considered a synonym of it.

Cattleyopsis delicatula was first described by Lemaire (1853) as the type of the genus. An examination of an illustration published with the protologue (lectotype) leads us to the conclusion that it is the Cuban form of *C. lindenii* and should be considered a synonym of it.

The floral similarities between *Cattleyopsis lindenii* and *Laeliopsis domingensis* (Lindl.) Lindl. has lead to a great deal of confusion in the literature. These two species can be easily distinguished by an examination of the column. *C. lindenii* has eight unequal pollinia and two basal appendages on the column, while in *L. domingensis*, the column bears four equal pollina and lacks basal appendages.

Specimens of *Cattleyopsis lindenii* were incorrectly referred to *Laeliopsis domingensis* by Britton & Millspaugh (1920) and to *Broughtonia domingensis* (Lindl.) Rolfe by Cogniaux (1910). *Laeliopsis domingensis* is a different species endemic to Hispaniola while *B. domingensis* is a synonym of it. In addition, Northrop (1902) referred specimens of *C. lindenii* to *B. lilacina* Henfr. which is also a synonym of *L. domingensis*.

3. **Cattleyopsis ortgiesiana** (Reichb. f.) Cogn. in Urban, Symb. Antill. 6: 546. 1910. (Figure 6)

Bletia ortgiesiana Reichb. f., Hamb. Gartenz. 420. 1860.

Broughtonia ortgiesiana (Reichb. f.) Dressler, Taxon 15: 241. 1966. TYPE: Locality not known. Cultivated in Botanical Garden in Zurich, by Mr. E. Ortiges. (HOLOTYPE: W).

Broughtonia sanguinea auct. non (Sw.) R. Br.: Cogn. in Urban, Symb. Antill. 6: 542, 1910; Griseb., Cat. Pl. Cub. 263, 1866.

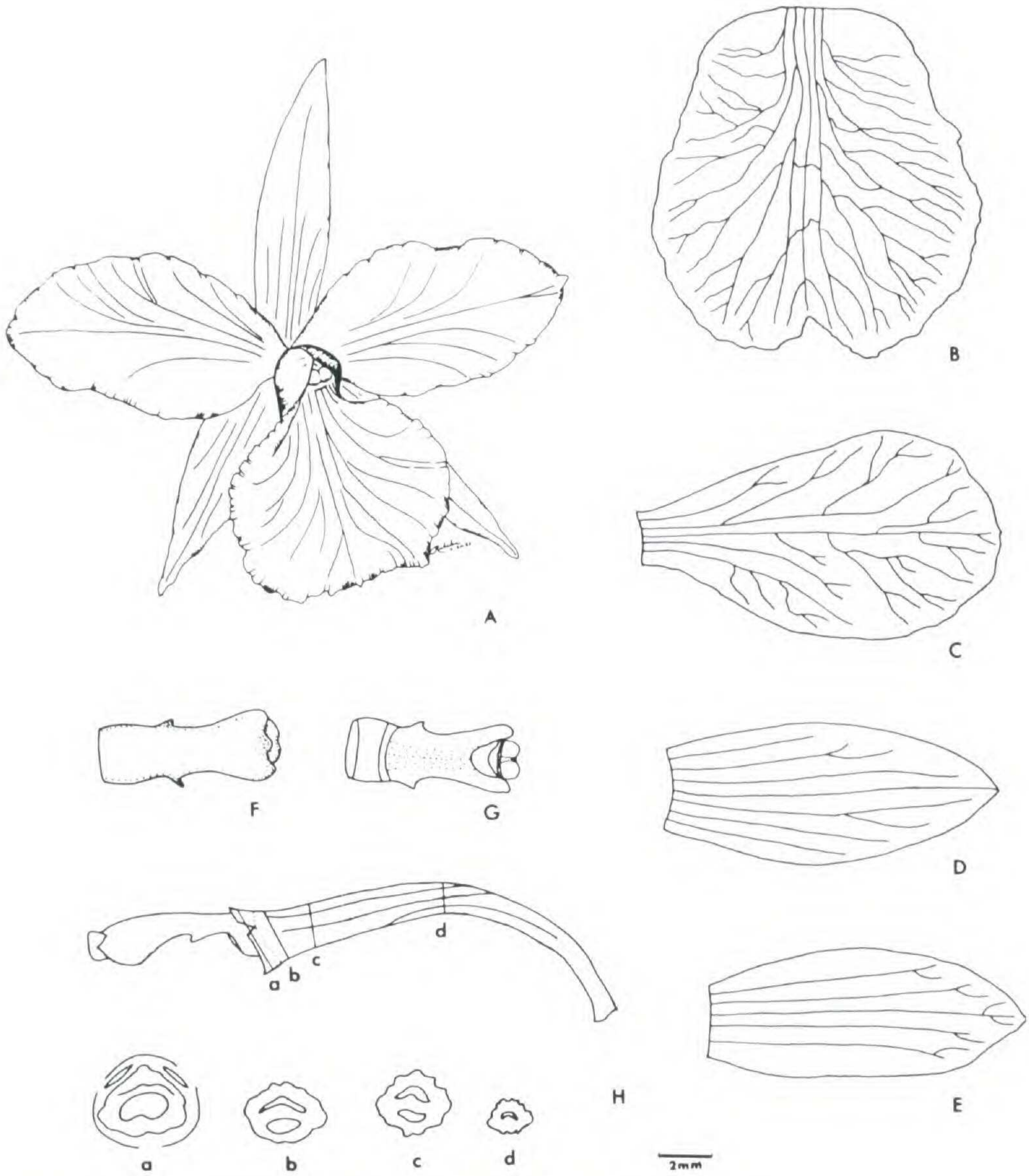

Figure 6. *Cattleyopsis ortgiesiana* (Reichb. f.) Cogn. **A.** Flower, frontal view. **B.** Labellum, frontal view. **C.** Petal. **D.** Dorsal sepal. **E.** Lateral sepal. **F.** Column, dorsal view. **G.** Column, ventral view. **H.** Column and ovary, lateral view and serial cross sections (a–d) showing nectary lumen.

Plant epiphytic, rhizomatous, to 58 cm tall; roots thick, velamentous; rhizome short, stout, creeping or ascending, enclosed by imbricating scarious sheaths; stem modified into pseudobulbs, erect or ascending, clustered, cylindric to narrowly pyriform, to 5 cm long, 1.4 cm wide, enclosed by scarious sheaths, to 2-leaved at apex; leaves fleshy-rigid, oblong to linear-oblong, obtuse, margin erose,

to 18 cm long, 2.4 cm wide; inflorescence to 53 cm tall, peduncle slender, erect, distantly several-sheathed, simple or paniculate raceme, to 20 flowers; floral bracts narrowly ovate, acute, to 0.4 cm long, 0.2 cm wide; ovary slender, to 2 cm long; sepals reddish-purple to pink, oblong, acute, to 1.7 cm long, 0.7 cm wide; petals reddish-purple to pink, obovate, obtuse, to 1.8 cm long, 0.9 cm wide; labellum reddish-purple, with a central basal white spot and with 8–12 radiating red veins, to 1.8 cm long, 1.8 cm wide, obovate to orbicular, basal margins involute, but not completely enclosing column, margin entire, undulate, emarginate; column reddish-purple to pink, to 0.7 cm long, 0.3 cm wide, anther reddish-purple to pink; capsule pendent, to 2.2 cm long, 1.1 cm thick.

REPRESENTATIVE SPECIMENS: CUBA: Prov. de Oriente, Playa de Punto Padre, 24 Jul 1959, *Lopez 10* (US); Prov. de Camaguey, near Camaguey, 2–7 Apr 1912, *Britton, Britton & Cowell 13143* (AMES, NY, US); Prov. de Pinar del Rio, vicinity of Coloma, 2 Mar 1911, *Britton & Cowell 9692* (NY); Prov. de Camaguey, 3 km E of Florida, 31 Mar 1950, *Cutler 12204* (AMES); Isle of Pines, Loma la Daguilla, 3 Mar 1916, *Britton, Britton & Wilson 15165* (AMES, NY, US).

FLOWERING PERIOD: Flowers sporadically throughout the year, mainly from December to March.

This species has been referred to *Broughtonia sanguinea* (SW.) R. Br. by Cogniaux (1910), Grisebach (1866) and Acuña (1939). These misidentifications account for the incorrect reports of *B. sanguinea* occurring in Cuba. *Broughtonia sanguinea* is a different species endemic to Jamaica.

Florally, *Broughtonia sanguinea* is similar to *Cattleyopsis ortgiesiana* but is distinctive in column morphology. The column of *C. ortgiesiana* bears eight unequal pollinia and has two basal appendages, while the column of *B. sanguinea* bears four equal pollinia and lacks basal appendages.

3. **Laeliopsis** Lindley in Paxton, Flow. Gard. 3: 155. 1853.

Epiphytic plants; rhizomatous; roots velamentous; stems modified into ovoid pseudobulbs; leaves fleshy-rigid, margin erose; inflorescence terminal; ovary pedicellate; labellum entire, narrowly obovate; column elongate, clavate, narrowly winged towards apex; anther terminal, incumbent, operculate; pollinia 4, equal, with a caudicle; capsule smooth, ellipsoid.

TYPE: **Cattleya domingensis** Lindl.

This is a monotypic genus occurring on Hispaniola and Mona Island.

1. **Laeliopsis domingensis** (Lindl.) Lindl., Paxt. Flow. Gard. III: 156, t. 105. 1853. (Figure 7)

Cattleya domingensis Lindl., Gen. & Sp. Orch. 118. 1831.
Bletia domingensis (Lindl.) Reichb.f., Walp. Ann. VI: 432. 1862.
Broughtonia domingensis (Lindl.) Rolfe, Gard. Chron. Ser. 3, V: 491. 1889. TYPE: SANTO DOMINGO, *MacKenzie s.n.* (HOLOTYPE: K-L, photograph seen).
Broughtonia lilacina Henfr. in Moore & Ayres, Gard. Mag. Bot. 3: 201. 1851. TYPE: No holotype designated. LECTOTYPE designated here: Plate in Moore & Ayres, Gard. Mag. Bot. 3, 1851, drawn from a plant collected on Hispaniola.
Broughtonia violacea Henfr. in Moore & Ayres, Gard. Mag. Bot. 3: 201. 1851. Published in synonomy.

Plant epiphytic, rhizomatous, to 110 cm tall; roots numerous, velamentous; rhizome short, stout, creeping or ascending, enclosed by imbricating scarious sheaths; stem modified into pseudobulb, erect or ascending, clustered, ovoid, to 6 cm long, 5 cm wide, enclosed by scarious sheaths, to 3-leaved at apex; leaves fleshy-rigid, oblong, obtuse to subacute, subcanaliculate, margin erose, to 18 cm long, 3 cm wide; inflorescence to 104 cm tall, peduncle slender, erect, distantly several-sheathed, simple or paniculate raceme, to 15 flowers; floral bracts ovate, acute, to 0.3 cm long, 0.3 cm wide; ovary slender, to 2.5 cm long; sepals pink to lavender, linear-oblong, acute, to 3.3 cm long, 0.6 cm wide; petals pink to lavender, broadly-oblanceolate to obovate, acute, to 3 cm long, 1.2 cm wide; labellum pink to lavender, to 4 cm long, 2.7 cm wide, narrowly obovate, basal margins involute, enclosing column, forming a tube, center of labellum with yellow villous lamellae terminating near apex, frontal margin with purple veins terminating near apex, margin minutely incised to crenate-dentate, undulate, shallowly emarginate; column pink, to 1.6 cm long, 0.5 cm wide, slender, anther pink to reddish-purple; capsule pendent, to 5.2 cm long, 2.4 cm thick.

REPRESENTATIVE SPECIMENS: **Hispaniola:** DOMINICAN REPUBLIC, Prov. La Romana, NE of La Romana, 19 Aug 1982, *Sauleda, Sauleda, Ragan & Dod 7450* (USF); Prov. Peravia, Bani, 19 Feb 1966, *Lavastre 2070* (NY); Prov. Altagarcia, SE of Playa El Macao, 13 May 1980, *Mejia & Zanoni 6263* (SDM); Prov. Monte Cristi, NW of Villa Sinda, 21 May 1980, *Mejia & Zanoni 6398* (SDM). HAITI, Ile de la Tortue,

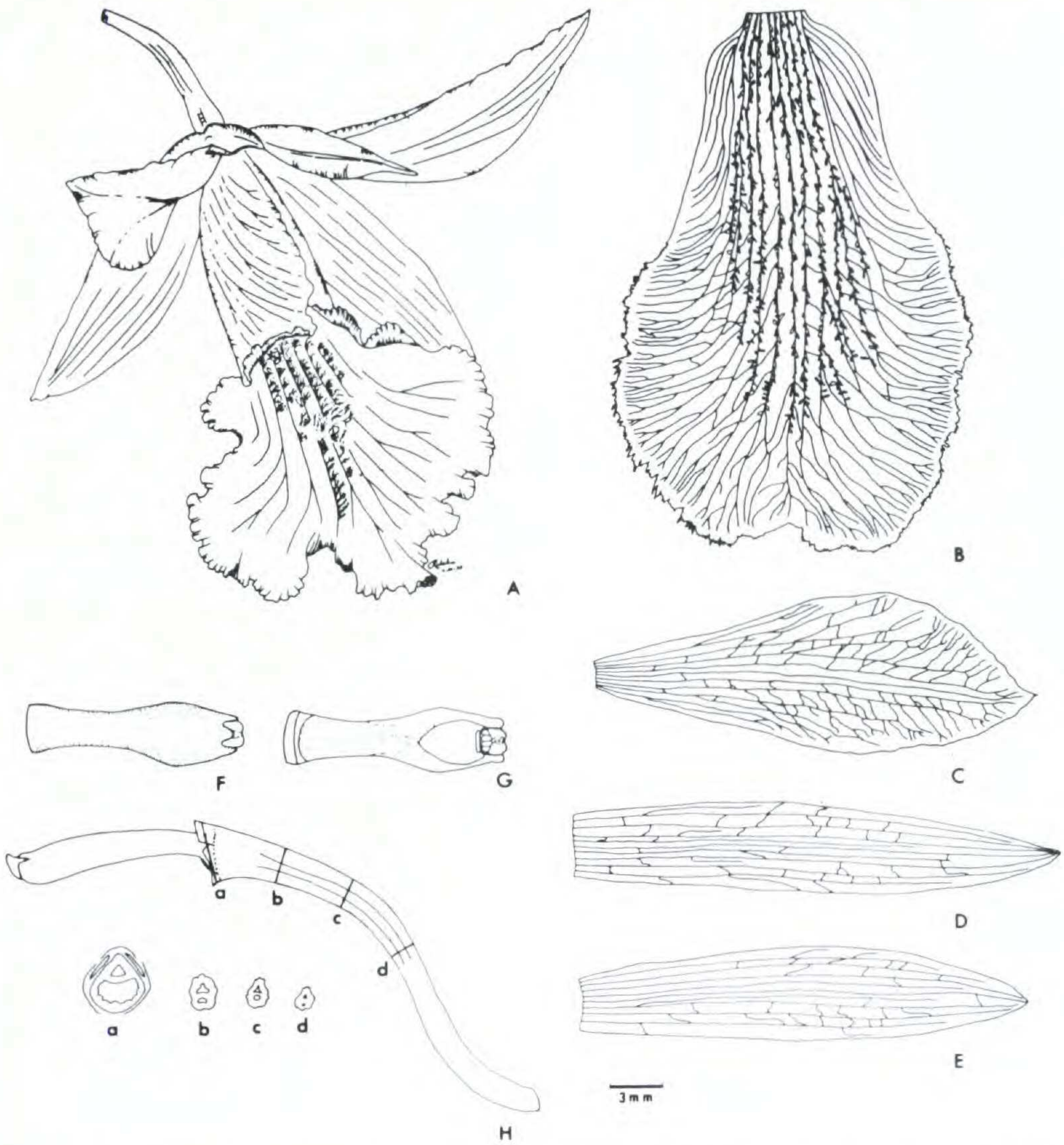

Figure 7. *Laeliopsis domingensis* (Lindl.) Lindl. **A.** Flower, frontal view. **B.** Labellum, frontal view. **C.** Petal. **D.** Dorsal sepal. **E.** Lateral sepal. **F.** Column, dorsal view. **G.** Column, ventral view. **H.** Column and ovary, lateral view and serial cross sections (a–d) showing nectary lumen.

vicinity of La Vallee, 3–10 May 1929, *Leonard & Leonard 15612* (NY, US); Dept. Du Nord, NW of Pedro Santana (D. R.), 27 Aug 1982, *Sauleda, Sauleda, Ragan & Dod 7617A* (USF).

FLOWERING PERIOD: Flowers sporadically throughout the year, mainly from April to June.

This species has been reported to occur in the Bahama Islands and Cuba based on misidentifications of *Cattleyopsis lindenii*

(Lindl.) Cogn., by Richard (1850), Britton & Millspaugh (1920) and Cogniaux (1910). Additionally, this species has been reported from Jamaica, based on misidentifications of *Broughtonia negrilensis* Fowlie, by Fawcett & Rendle (1910), Cogniaux (1910) and Grisebach (1864).

Laeliopsis domingensis is florally similar to *Cattleyopsis lindenii* and *Broughtonia negrilensis*. These three species can be distinguished easily by examining column morphology. *Cattleyopsis lindenii* has eight unequal pollinia and two basal appendages on the column, while *B. negrilensis* and *L. domingensis* both have four equal pollina and lack basal appendages. *Broughtonia negrilensis* is distinguished from *L. domingensis* by having a short column relative to the pedicel, thick wings on the column and a nectary which is swollen proximally. *Laeliopsis domingensis* has an elongate column relative to the pedicel, narrow column wings and a nectary not swollen proximally.

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